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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/781,341	02/12/2001	Shih-Yuan Wang	0980/62251-C	1971

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EXAMINER

WANG, GEORGE Y

ART UNIT	PAPER NUMBER
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2882

DATE MAILED: 11/01/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

09/781,341

Applicant(s)

WANG, SHIH-YUAN

Examiner

George Y. Wang

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-40 is/are pending in the application.
- 4a) Of the above claim(s) 19-40 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-18 is/are rejected.
- 7) ☒ Claim(s) 1 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 21 February 2002 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 4,7.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: .

## DETAILED ACTION

### *Election/Restrictions*

1. Restriction to one of the following inventions is required under 35 U.S.C.

121:

- I. Claims 1-18, drawn to an optical fiber coupling device, classified in class 385, subclass 50.
- II. Claims 19-28, drawn to a method of making an optical fiber, classified in class 65, subclass 435.
- III. Claims 29-36, drawn to an optical fiber, classified in class 385, subclass 123.
- IV. Claims 37-40, drawn to a method of making an optical fiber, classified in class 65, subclass 378.

2. The inventions are distinct, each from the other because of the following reasons:

3. Inventions III and I are related as combination and subcombination, respectively. Inventions in this relationship are distinct if it can be shown that (1) the combination as claimed does not require the particulars of the subcombination as claimed for patentability, and (2) that the subcombination has utility by itself or in other combinations (MPEP § 806.05(c)). In the instant case, the combination as claimed does not require the particulars of the

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subcombination as claimed because any coupling means that joins fibers of different refractive indices could be used. Furthermore, the subcombination has separate utility such as independent signal propagation, alignment, and fiber splicing.

4. Inventions II and I are related as process of making and product made, respectively. The inventions are distinct if either or both of the following can be shown: (1) that the process as claimed can be used to make other and materially different product or (2) that the product as claimed can be made by another and materially different process (MPEP § 806.05(f)). In the instant case the coupling device can be made without forming wafer slices. Furthermore, the method can be applied to a variety of other uses that are not limited making optical couplers, but also to independent optical fibers, waveguides, performs, and lenses.

5. Inventions IV and III are related as process of making and product made, respectively. The inventions are distinct if either or both of the following can be shown: (1) that the process as claimed can be used to make other and materially different product or (2) that the product as claimed can be made by another and materially different process (MPEP § 806.05(f)). In the instant case the optical fiber can be made a variety of methods that include fusion splicing, stretching, drawing, vapor deposition, flame hydrolysis, and tube collapsing, all of which are not limited to core selection and cladding layering.

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6. Because these inventions are distinct for the reasons given above and have acquired a separate status in the art because of their recognized divergent subject matter, restriction for examination purposes as indicated is proper.

During a telephone conversation with Ivan Kavrukov on 24 October 2002 a provisional election was made without traverse to prosecute the invention of 09/781,341, claims 1-18. Affirmation of this election must be made by applicant in replying to this Office action. Claims 19-40 are withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

### ***Specification***

7. The abstract of the disclosure is objected to because it is too long. The abstract should be in narrative form and generally limited to a single paragraph on a separate sheet within the range of 50 to 150 words. It is important that the abstract not exceed 150 words in length since the space provided for the abstract on the computer tape used by the printer is limited. Applicant is reminded of the proper language and format for an abstract of the disclosure. Correction is required. See MPEP § 608.01(b).

### ***Claim Objections***

8. Claim 1 is objected to because it has been held that the recitation that an element is "adapted to" perform a function is not a positive limitation but only requires the ability to so perform. It does not constitute a limitation in any

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patentable sense and is therefore not given any patentable weight. *In re Hutchinson*, 69 USPQ 138. Appropriate correction is required.

***Claim Rejections - 35 USC § 103***

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

10. Claims 1-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over DiGiovanni et al. (U.S. Patent No. 5,802,236, from hereinafter "DiGiovanni") in view of Van Der Tol (U.S. Patent No. 5,418,867).

As to claim 1, Van Der Tol discloses an optical device for coupling a first optical waveguide (fig. 2, ref. A) with a first cross-sectional material pattern to a second optical waveguide (fig. 2, ref. E) with a second cross-sectional material pattern different from that of the first using an optical coupling waveguide (fig. 2, ref. C) a first end that has a cross-sectional pattern that matches and connects to the first optical waveguide, a second end that has a cross-sectional pattern that matches and connects to the second optical waveguide, and a transitional regions between the first and second ends configured so that an optical signal entering the first end propagates adiabatically to the second end (abstract).

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However, Van Der Tol does not specifically disclose waveguides with a fiber structure. Furthermore, the reference fails to specifically teach the avoidance of optical signal reflections back into the first optical fiber.

DiGiovanni discloses an optical device with a microstructure optical fiber having various cross-sectional void patterns (abstract).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have avoided optical signal reflections back into the first optical fiber since one would be motivated to maximize optical transmission. Van Der Tol suggests an optical device where low attenuation and low optical signal reflection is vital to wavelength-sensitive signal propagation (col. 2, lines 12-19).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to use a fiber structure for the waveguide coupling device since one would be motivated to have properties that are unattainable in conventional optical waveguides and fibers (col. 3, lines 1-3). Provided that the fiber meets some simple conditions, an effective refractive index difference between core and cladding can be much larger than traditional doping means (col. 3, lines 4-11), making it highly useful in communication systems employing dispersion compensation, amplification, laser, saturation absorption, gratings, and non-linear elements (abstract).

Regarding claim 2-5, Van Der Tol disclose the optical device recited above with a transitional region having a cross-sectional pattern that changes gradually from the first end pattern to that of that of the second end pattern over

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an axial distance that is at least ten thousand times longer (fig. 4a; col. 9, lines 11-22) than a wavelength of the optical signal.

However, the reference fails to disclose void and solid patterns characterized by size, center-to-center spacings, and by the number of voids and where the transition sequence of void patterns changes gradually from the first end pattern to that of that of the second end pattern over an axial distance that is at least ten thousand times longer than a wavelength of the optical signal.

DiGiovanni discloses an optical device with void (col. 7, lines 5-23) and solid (col. 7, lines 24-25) patterns in the optical fibers characterized by size, center-to-center spacings, and by the number of voids (abstract; col. 7, lines 8-16).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to include void and solid patterns in the optical fibers and to characterize them by size, center-to-center spacings, and by the number of voids into the transitional region so that the void sequence changes gradually from the first end pattern to that of that of the second end pattern over an axial distance that is at least ten thousand times longer than a wavelength of the optical signal since one would be motivated by the fact that a microstructured optical fiber (abstract), with void (col. 7, lines 5-23) and solid (col. 7, lines 24-25) patterns, has properties that are unattainable in conventional optical waveguides and fibers (col. 3, lines 1-3). Provided that the fiber meets some simple conditions, an effective refractive index difference between core and cladding can be much larger than traditional doping means (col. 3, lines 4-11), making it highly useful in



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communication systems employing dispersion compensation, amplification, laser, saturation absorption, gratings, and non-linear elements (abstract).

As per claim 6, Van Der Tol teaches a transition region having a core that tapers gradually from the first end pattern to that of that of the second end (col. 2, lines 49-52).

Regarding claim 7, Ven Der Tol and DiGiovanni disclose the apparatus as recited above. However, the references fail to specifically teach void sizes of the transition sequence decreasing gradually to zero at the second end.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have void sizes of the transition sequence decreasing gradually to zero at the second end since one would be motivated to provide solid patterning at the second end (col. 7, lines 24-25). Thus, in order to do so, one of ordinary skill in the art would recognize that a gradual decrease in void size would allow for the fiber to change to solid patterning that has advantageous uses in dispersion compensation, amplification, laser, saturation absorption, gratings, and non-linear elements (abstract).

As to claim 8, Van Der Tol discloses the optical device recited above. However, the reference fails to disclose a transition region core having a material refractive index profile selected so that the effective refractive index profile varies linearly over the axial distance from the first end to the second end.

DiGiovanni discloses an optical device with core having a variable refractive index profile over the axial distance of the core (col. 4, lines 26-32).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have a transition region core having a material refractive index profile selected so that the effective refractive index profile varies linearly over the axial distance from the first end to the second end since one would be motivated to vary the features of the fiber so that the fiber supports the desired guided mode or modes (col. 4, lines 26-32). Moreover, such flexibility permits a wide range of uses that include dispersion compensation, amplification, laser systems, saturation absorption, gratings, and non-linear elements (abstract).

As to claim 9, Van Der Tol discloses an optical device for coupling a first optical waveguide (fig. 2, ref. A) with a first cross-sectional material pattern to a second optical waveguide (fig. 2, ref. E) with a second cross-sectional material pattern different from that of the first using an optical coupling waveguide (fig. 2, ref. C) a first end that has a cross-sectional pattern that matches and connects to the first optical waveguide, a second end that has a cross-sectional pattern that matches and connects to the second optical waveguide, and a transitional regions between the first and second ends configured so that an optical signal entering the first end propagates adiabatically to the second end (abstract).

However, Van Der Tol does not specifically disclose waveguides with a microstructured optical fiber structure. Although the reference teaches the

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matching of solid cross-sectional patterns, Van Der Tol does not specifically teach the matching of void patterns and refractive index profiles.

DiGiovanni discloses an optical device with a microstructure optical fiber having various cross-sectional void patterns and refractive index profiles (abstract).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to use a microstructured optical fiber structure having various cross-sectional void patterns and refractive index profiles in the waveguide coupling device since one would be motivated to have properties that are unattainable in conventional optical waveguides and fibers (col. 3, lines 1-3). Provided that the fiber meets some simple conditions, an effective refractive index difference between core and cladding can be much larger than traditional doping means (col. 3, lines 4-11), making it highly useful in communication systems employing dispersion compensation, amplification, laser, saturation absorption, gratings, and non-linear elements (abstract).

As per claim 10, Van Der Tol disclose the optical device recited above with a transitional region having a cross-sectional pattern that changes gradually from the first end pattern to that of that of the second end pattern over an axial distance that is at least ten thousand times longer (fig. 4a; col. 9, lines 11-22) than a wavelength of the optical signal.

Regarding claims 11-15 and 17-18, Ven Der Tol and DiGiovanni disclose the apparatus as recited above. However, the references fail to specifically teach void sizes of the transition sequence core and cladding that decrease and increase, respectively, gradually to the size at the second end. Furthermore, the reference fails to specifically teach void and solid patterns characterized by size, center-to-center spacings, and by the number of voids and where the transition sequence of void patterns changes gradually from the first end pattern to that of that of the second end pattern over an axial distance of the fiber.

DiGiovanni discloses an optical device with void (col. 7, lines 5-23) and solid (col. 7, lines 24-25) patterns in the optical fibers characterized by size, center-to-center spacings, and by the number of voids (abstract; col. 7, lines 8-16).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to include void and solid patterns in the optical fibers and to characterize them by size, center-to-center spacings, and by the number of voids into the transitional region so that the void sequence changes gradually from the first end pattern to that of that of the second end pattern over an axial distance that is at least ten thousand times longer than a wavelength of the optical signal since one would be motivated by the fact that a microstructured optical fiber (abstract), with void (col. 7, lines 5-23) and solid (col. 7, lines 24-25) patterns, has properties that are unattainable in conventional optical waveguides and fibers (col. 3, lines 1-3). Provided that the fiber meets some simple conditions, an effective refractive index difference between core and cladding can be much

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larger than traditional doping means (col. 3, lines 4-11), making it highly useful in communication systems employing dispersion compensation, amplification, laser, saturation absorption, gratings, and non-linear elements (abstract).

It would have also been obvious to one of ordinary skill in the art at the time the invention was made to have void sizes of the transition sequence core increase and the clad decrease gradually to the size at the second end since one would be motivated to provide solid patterning at the second end (col. 7, lines 24-25). Thus, in order to do so, one of ordinary skill in the art would recognize that a gradual decrease in void size would allow for the fiber to change to solid patterning that has advantageous uses in dispersion compensation, amplification, laser, saturation absorption, gratings, and non-linear elements (abstract).

As to claim 16, Van Der Tol discloses the optical device recited above. However, the reference fails to disclose a transition region core having a material refractive index profile selected so that the effective refractive index profile varies linearly over the axial distance from the first end to the second end.

DiGiovanni discloses an optical device with core having a variable refractive index profile over the axial distance of the core (col. 4, lines 26-32).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have a transition region core having a material refractive index profile selected so that the effective refractive index profile varies linearly over the axial distance from the first end to the second end since one would be

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motivated to vary the features of the fiber so that the fiber supports the desired guided mode or modes (col. 4, lines 26-32). Moreover, such flexibility permits a wide range of uses that include dispersion compensation, amplification, laser systems, saturation absorption, gratings, and non-linear elements (abstract).


### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to George Y. Wang whose telephone number is 703-305-7242. The examiner can normally be reached on M-F, 8 am - 4:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Robert H. Kim can be reached on 703-305-3492. The fax phone numbers for the organization where this application or proceeding is assigned are 703-308-7722 for regular communications and 703-308-7724 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

gw  
October 29, 2002

  
ROBERT H. KIM  
SUPERVISORY PATENT EXAMINER  
TECHNOLOGY CENTER 2